

the variation of the position of absorption bands which is likely to be produced by association of solvent with solute. Due recognition is given to the importance of the work now being carried out by Purvis on the selective absorption of substances in the state of vapour, in which case the influence of solvent is quite eliminated.

Considerable interest attaches to the attempted physical explanation of selective absorption, and use is made of the mass of experimental material accumulated by Hartley, Baly, and others. Baly's idea of "isorropesis" does not commend itself to the author, who is in favour of an electronic theory.

As may be expected in a book written in the Leipzig laboratory, much attention is given to the quinonoid rearrangement frequently assumed when a change in colour accompanies salt formation. One might gather from this portion of the work that "chinoide Umlagerung" was specially associated with Leipzig; e.g. on p. 169 one finds regarding phenolphthalein:—

"Der Beweis, dass den Salzen chinoide Konstitution zukommt, beruht auf der Existenz zweier verschiedener Äther. Neben dem farblosen laktoiden Dimethyläther existiert ein roter chinoider Äther, der zuerst von Green und King dargestellt und eingehend auch von K. H. Meyer und Hantzsch, untersucht wurde."

One would scarcely realise the great importance of Prof. Green's work on the phthaleins by reading this passage; and it may be pointed out (see pp. 176-7) that the hydroxy- and amino-azo-compounds have engaged the attention of several workers.

The colours of complex salts introduces some inorganic chemistry, whilst in the last few pages—devoted to method—spectroscopes, spectrographs, &c., are described, and an outline of the manner of working with these instruments is given. J. T. H.

#### THE NON-METALLIC MINERALS OF ECONOMIC VALUE.

*Die wichtigsten Lagerstätten der Nicht-Erze.* By Dr. O. Stutzer. Erster Teil, Graphit, Diamant, Schwefel, Phosphat. Pp. xv+474. (Berlin: Gebrüder Borntraeger, 1911.) Price 16 marks.

THIS work is designed to supplement the treatise of Prof. Beck on "Mineral Veins and their Contents," by giving an account of the deposits of those useful mineral substances which are not classed as "ores." The first volume, now published, is evidently the fruit of a vast amount of labour and bibliographical research, and deals only with four classes of materials, to each of which the amount of space devoted is as follows—graphite, 88 pages; diamonds, 94 pages; sulphur, 81 pages; and phosphates, 198 pages. In the case of each of these materials, the author, after preliminary notices of its mineralogical characters and modes of occurrence, proceeds to compile from the most varied sources descriptions of each of the districts in which it occurs. These descriptions are illustrated by page blocks (of which there are no fewer than 108 in the volume) giving

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sketch maps, sections, drawings, and photographs. Very miscellaneous information is supplied in these accounts of localities, including statistics of annual yield with prices and total values, and even, in some cases, examples of forms of agreement between sellers and buyers. In the case of the South African diamond fields, however, these statistics are, unfortunately, not brought down to later date than the year 1908.

As a rule, the references to authorities are ample and satisfactory, but we notice some marked exceptions. The author's acquaintance with British scientific literature would appear to be much more limited than his knowledge of German, American, and even Japanese sources of information. Thus a section of the Upware phosphatic beds is stated to be "after W. Keeping-Penrose," and the puzzled English reader is left to find out that the information about British deposits is obtained, at second hand, from a Bulletin of the United States Geological Survey, written by Mr. R. A. F. Penrose, jun., in 1888! We are reminded of the ingenuous remark of a compatriot of the author, who, when it was pointed out to him that a research he had published had been long before anticipated in this country, said, "Ah, that was buried in the catacombs of the Royal Society's Transactions!" In like manner, we find that Mr. Teall's interesting account of the phosphatised trachyte of Clipperton Atoll, published in the Quarterly Journal of the Geological Society in 1898, is ignored, while many less interesting deposits in the Pacific are fully described.

After the discussions of the distribution and statistics of the materials in the various districts, the author proceeds to consider such general questions as their origin, artificial formation, and metamorphoses. The treatment of these more purely scientific problems, however, is quite subordinate to that of economic and statistical questions, and little of novelty or special interest is to be found in these sections of the book.

An exception to this may, perhaps, be found in the useful abstract, on pp. 254 to 262, of the views that have been put forward concerning the origin of beds of sulphur, including the possible production of some of these deposits through the agency of bacteria, like Beggiatoa and Chromatium. On the whole, however, the work is to be commended for its technological rather than its scientific value.

#### ELECTRICITY AND MAGNETISM.

- (1) *Beispiele und Uebungen aus Elektrizität und Magnetismus.* By Prof. R. Weber. Fünfte Auflage. Pp. viii+330. (Leipzig and Berlin: B. G. Teubner, 1910.) Price 4.80 marks.
- (2) *Experimentelle Elektrizitätslehre, verbunden mit einer Einführung in die Maxwellsche und die Elektronentheorie der Elektrizität und des Lichts.* By Prof. H. Starke. Zweite Auflage. Pp. xvi+662. (Leipzig and Berlin: B. G. Teubner, 1910.) Price 12 marks.

(1) THIS is a collection of nearly nine hundred examples in electricity and magnetism. They are all numerical in character, and each is completely

worked out. Where required, the exercise is explained by means of a diagram. It is recognised that certain preliminaries are required to enable the student to understand electrical problems, and, to this end, the earlier questions relate purely to mechanics, hydrostatics, and heat. The examples are very varied in type, and include cases of interest, both theoretically and practically. There follows a short section in which the various mechanical, thermal, and electrical units are defined, and the book concludes with numerous tables, in which these units are collected, together with others giving the values of the various physical constants required in the working of the exercises.

It is somewhat doubtful whether the procedure of asking a question and at once giving the answer can be of much benefit to a student. It surely tends to discourage the use of the student's own initiative. A few illustrative worked examples should suffice, the rest being left for the learner to undertake.

The book is well printed, but it may be mentioned that some six of the introductory pages are missing from the copy submitted to the reviewer; it is to be hoped that this mistake does not extend to the whole edition.

(2) The second edition of this excellent treatise on electricity and magnetism, by Prof. Starke, has been brought thoroughly up to date by the addition of numerous paragraphs and chapters. Besides all the experimental and theoretical considerations usually found in text-books on this subject, many special electrical applications are dealt with at length. Particular attention is given to the production and properties of electro-magnetic waves and to the practical uses of the latter in wireless telegraphy and telephony. As indicated in the title, the electro-magnetic theory of light is also dealt with, especially the explanations of the various optical phenomena upon the electron theory. In the thirteenth chapter this theory is extended to thermal and electrical conduction, and to the different thermo-electric effects. The section devoted to the conduction of electricity in gases has been largely added to, so that most of the latest work in this department of physics is considered. The new chapter on radio-activity gives a brief general outline of the rapidly progressing work which has been done in this direction, and includes a table giving the various radio-active substances at present known, their life-periods, types of rays, and physical properties. Finally, the author devotes an appendix of considerable length to the theory of moving electrons and the principle of relativity.

In every respect this book has claims to be regarded as a standard work on electro-magnetism. The alterations and additions in this edition have brought it, as far as possible in a general text-book, to the level of modern scientific research. To all those desirous of becoming acquainted with the present state of knowledge in this subject it can therefore be thoroughly recommended. It may also be mentioned that the type, diagrams, and paper are excellent.

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#### CELLULOSE EPHEMERIDES.

*Literatur der Zellstoff- und Papier-Chemie und der Papier-Technik im Jahre 1909.* In Auszügen dargestellt. By Prof. C. G. Schwalbe and A. Lutz. Pp. 158+xix+94. (Berlin: Gebrüder Borntraeger, 1911.) Price 5 marks.

*Zur Kenntnis der Cellulosearten.* By Dr. W. Schulz. Nebst einem Vorwort, by Prof. C. G. Schwalbe. Pp. vi+100. (Berlin: Gebrüder Borntraeger, 1911.) Price 3.20 marks.

THESE publications are indicative of the extraordinary specialisation of cellulose chemistry, and at the same time of a tendency to intensive elaboration of detail in investigation, and more particularly of records, which, however interesting to the specialist, are drawn in too narrow a perspective to rank in the general literature of the science.

The former is a bibliographical record, sufficiently defined by its title. It is produced under the auspices of a youthful technical society, the "Verein der Zellstoff- und Papier-Chemiker," which is doing much useful work, and very fully justifying its foundation and existence. The matter of the volume is exhaustive, the records take the form of abstracts, which are duly concentrated and presented under a well-considered scheme of classification, with full indexes.

The second volume is a record of research towards establishing a method of diagnosing the more important industrial celluloses in terms of differentiating factors. This work is evidently inspired by Prof. C. G. Schwalbe, and in a short preface he claims for the author's results at least a definite promise of achievement, a claim which is somewhat at variance with the conclusions recorded *en résumé* on pp. 85-86, 99-100; these are rather of negative import.

The main scheme of investigation is a study of acid hydrolysis, taking as a measure of the degree of hydrolysis the reactions of the products with alkaline cupric oxide (Fehling's solution), and as a first stage (a) combination in the cold with cupric oxide (hydrate), and secondly (b) reduction to cupric oxide, on boiling.

The quantitative determinations are recorded under a special nomenclature, thus:—"Cellulosezahlen" (a) "Korrigierte Kupferzahlen" (b-a); and after the particular hydrolytic treatment "Hydrolysierzahl" (b') and "Korrigierte Hydrolysierzahl" (b'-a').

The numbers recorded for a selection of ten typical marks of sulphite celluloses are, as the author admits (*loc. cit.*), unconvincing. An *a priori* consideration of the method would, we think, have enabled the author to predict the generally inconclusive result. It has been long established that the hydrolytic resolutions of cellulose can proceed very far under the action both of acids and alkalis without liberating CO groups. It is clear therefore that cupric reduction is only a partial measure of cellulose hydrolysis. And generally oxidations by alkaline cupric oxide are highly complex reactions, even the classical reactions with the sugars are by no means well defined, and remain therefore of essentially empirical order. Without detracting in any way from the author's results as quantitative observations, we suggest that they